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A revision of the diatom genus *Lyrella* Karayeva (Bacillariophyta: Lyrellaceae) from the Black Sea, with descriptions of five new species

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Abstract

The focus of this study is the benthic diatom flora of the coastal zone of the Black Sea, in particular that of the Ukrainian part of the Crimean Peninsula. Critically revised taxa belonging to the genus *Lyrella* Karayeva (Bacillariophyta: Lyrellaceae) are presented. We compared information on *Navicula* section Lyratae, published over the last few decades, with our observations using both light (LM) and scanning electron microscopy (SEM). *Lyrella* taxa considered here are characterized in terms of their morphology and ultrastructure. Light and electron micrographs of holotype (where possible) and published line-drawings are provided. The nomenclature is revised and valid taxonomic names with their synonyms are proposed. Information on the taxonomy, autecology, biogeography (distribution in the Black Sea and elsewhere) and on the diversity of *Lyrella* taxa is presented. Comprehensive bibliography, and list of Black Sea taxa in *Lyrella* combined 25 species and infraspecific taxa are included. Five of these species are new: *Lyrella abruptapontica sp. nov.*, *Lyrella karayevae sp. nov.*, *Lyrella pontieuxini sp. nov.*, *Lyrella pseudolyra sp. nov.* and *Lyrella ruppelii sp. nov.* In addition, six new combinations are proposed: *Lyrella dilatata*, *Lyrella aestimata*, *Lyrella rudiformis*, *Lyrella granulata*, *Lyrella rattrayi* and *Lyrella bacillifera*. Four *Lyrella* taxa are reported from Black Sea diatom assemblages for the first time: *Lyrella barbara*, *Lyrella dilatata*, *Lyrella fogedii* and *Lyrella majuscula*.

Key words: Benthic diatoms; Black Sea; Crimea; *Lyrella*; new species; new combinations

Introduction

The Black Sea is an internal basin situated within the Eurasian continent. It is connected with the Mediterranean Sea through the Bosphorus and Dardanelles (Zaitsev & Mamaev 1997). This fact influences the physical and chemical parameters, e.g. water cycle and biology, with the potential for an exchange of species. The diatom assemblages of the Black Sea, therefore, show some features peculiar to the area due to these environmental conditions. The diversity of diatom assemblages apparently results from a combination of ancient marine, native species combined with freshwater forms and Mediterranean marine forms. Black Sea benthic diatoms have been studied for over a century (e.g. Mereschkowski 1902, Proshkina-Lavrenko 1963a, 1963b, Guslyakov *et al.* 1992, Witkowski *et al.* 2010). However, there is comparatively little published information on the diatom flora of the Black Sea. Earlier studies were mostly performed on the western and northwestern parts of the Black Sea basin, whereas the shores of Crimea and Caucasus have been investigated less frequently. Information on diatom assemblages from the southern part of the Black Sea is almost

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